

Model Uncertainty Analysis, Field Data Collection, and Analysis of Contaminated Vapor Intrusion into Buildings

Jim Weaver

Hydrologist

U.S. EPA Office of Research and Development (ORD)/National Exposure Research Laboratory (NERL)/ Ecosystems Research Division (ERD)/RSB

(706) 355-8329

weaver.jim@epa.gov

Authors: Fred D. Tillman², James W. Weaver¹, David Spidle¹, Sandra L. Bird¹

¹U.S. EPA ORD/NERL/ERD/RSB

²National Research Council

Keywords: vapor intrusion, indoor air quality, risk-based corrective action, volatile organic compounds, Johnson and Ettinger Model

Vapor intrusion is the term used to describe the migration of volatile chemicals from the subsurface into overlying buildings. Volatile organic contaminants (VOCs) are frequently associated with contamination from leaking fuel storage tanks and releases from dry cleaners and industrial facilities. When these contaminants are present in soil or groundwater, they may volatilize and enter homes or businesses through cracks in basement floors or slabs.

To address uncertainty associated with the evaluation of these problems, we are working on a three-part strategy that includes (1) evaluation of uncertainty in model-based assessments, (2) collection of field data, and (3) assessment of sites using U.S. Environmental Protection Agency (U.S. EPA) and state protocols. To achieve these goals, we are working with the Georgia Environmental Facilities Authority (GEFA). The GEFA manages underground storage tanks that are owned by the State of Georgia including highway patrol, department of transportation, forestry department, welcome center, and university facilities. The conventional approach to assessing vapor intrusion sites is to use a simplified model (the “Johnson–Ettinger” model) with only a few site-specific parameters. Through the U.S. EPA’s provision of software for automated uncertainty analysis of the model (<http://www.epa.gov/athens/onsite>), users of the model may themselves determine the significance of input parameters. To test the results of our uncertainty analysis, we are beginning to use various sampling techniques, including trained vapor-detecting dogs (http://www.epa.gov/athens/research/regsupport/Detection_Dogs.html) at GEFA sites. In addition, we have constructed a dedicated facility for soil and vapor intrusion testing (<http://www.epa.gov/athens/research/regsupport/vi.html>). Use of data from the GEFA and research sites in an assessment according to established protocols is anticipated to provide an evaluation of the overall approach to vapor intrusion and insight on the role of the simplified transport models for state agencies.

Although this work was reviewed by the U.S. EPA and approved for publication, it may not necessarily reflect official Agency policy.